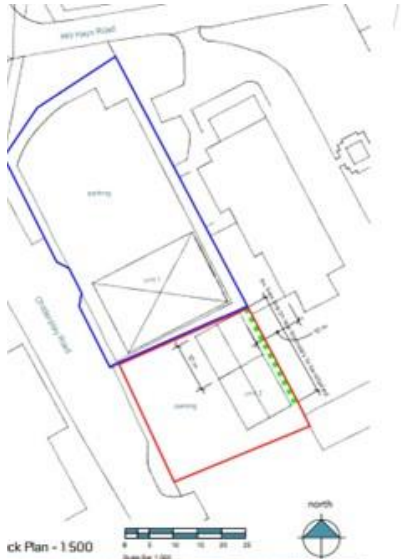




EARTH ENVIRONMENTAL
& GEOTECHNICAL

Coal Mining Risk Assessment

Moorland Self Drive

Knypersley

Stoke-on-Trent

October 2024

On behalf of

Moorland Self Drive



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COAL MINING RISK ASSESSMENT

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1.0 INTRODUCTION

Appointment

- 1.1 Earth Environmental & Geotechnical Ltd have been commissioned by Moorland Self Drive (the Client), to undertake a Coal Mining Risk Assessment for a proposed extension to an existing workshop unit.
- 1.2 The extension will create 2no. additional vehicle maintenance bays.
- 1.3 A planning application (SMD/2024/0436) has been submitted to Staffordshire Moorland District Council.
- 1.4 A proposed development plan has been provided shown as Figure 1.

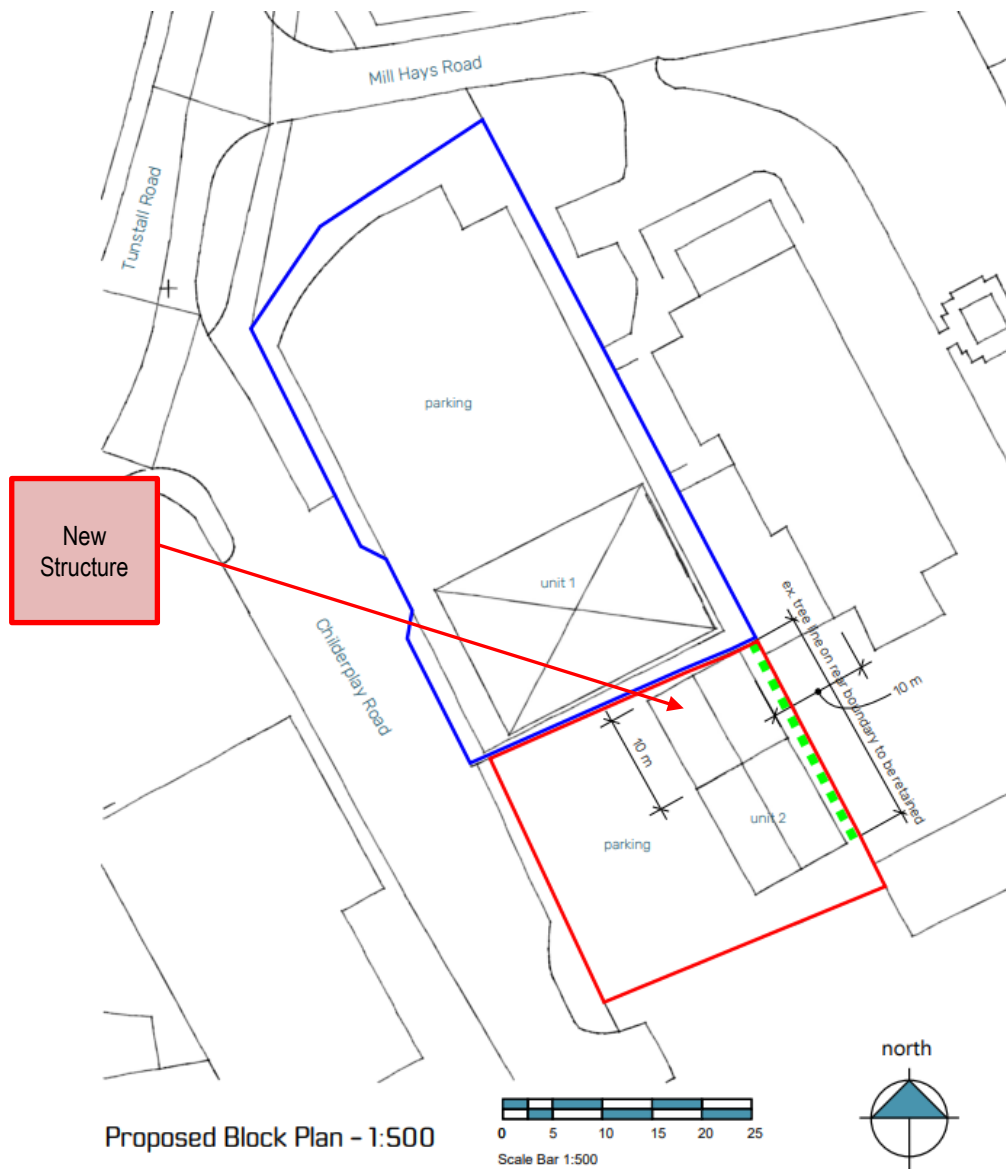
Objective

- 1.5 The purpose of the Coal Mining Risk Assessment is to collate available geological, mining, and historical data in order to assess the potential for the site to be affected by underground mining.
- 1.6 This report has been drafted in accordance with the Coal Authority (CA) Guidance Risk Based Approach to Development Management, Version 4, 2017.

Sources of Information

- 1.7 The Coal Mining Risk Assessment compiles a review of the following information sources:
 - British Geological Survey of England and Wales, SJ85NE 1/10,000 scale, edition of 1992.
 - Coal Authority Interactive Map Viewer.
 - Coal Authority Mining Report.
 - British Geological Survey online borehole records.
 - Google Earth imagery.
 - Online Historical Ordnance Survey maps.
 - Site Investigations in Areas of Mining Subsidence, FG Bell, 1975.
 - The threat of abandoned mines on the stability of urban areas, Barry Clarke, IAEG2006 Paper Number 379, The Geological Society of London, 2006.
 - The collapse of shallow coal mine workings, Durham theses, Durham University, Garrard, 1981.
 - Construction over abandoned mineworking's, CIRIA Special Publication 32, 2002.
 - Abandoned Mineworking's Manual, CIRIA 2019.
 - Staffordshire Moorland District Council planning portal.
 - National Library of Scotland, British Geological Survey Scotland, <https://maps.nls.uk/>

Figure 1: Proposed Development Plan



2.0 SITE LOCATION AND DESCRIPTION

- 2.1 The site is located approximately 4km north east of Kidsgrove town centre.
- 2.2 The approximate National Grid Reference for the centre of the site is SJ 88045 55238 (X: 388045, Y:355238) with the site postcode being ST8 7PZ.
- 2.3 The application site is located within a mixed commercial and residential area setting and lies at an elevation of approximately 197mAOD.
- 2.4 The site is situated off Childerplay Road, adjacent to Springbank Nursing Home and Millhayes Test Centre.
- 2.5 A location plan is shown below as Figure 2 with a photograph provided as Figure 3.

Figure 2: Site Location Plan

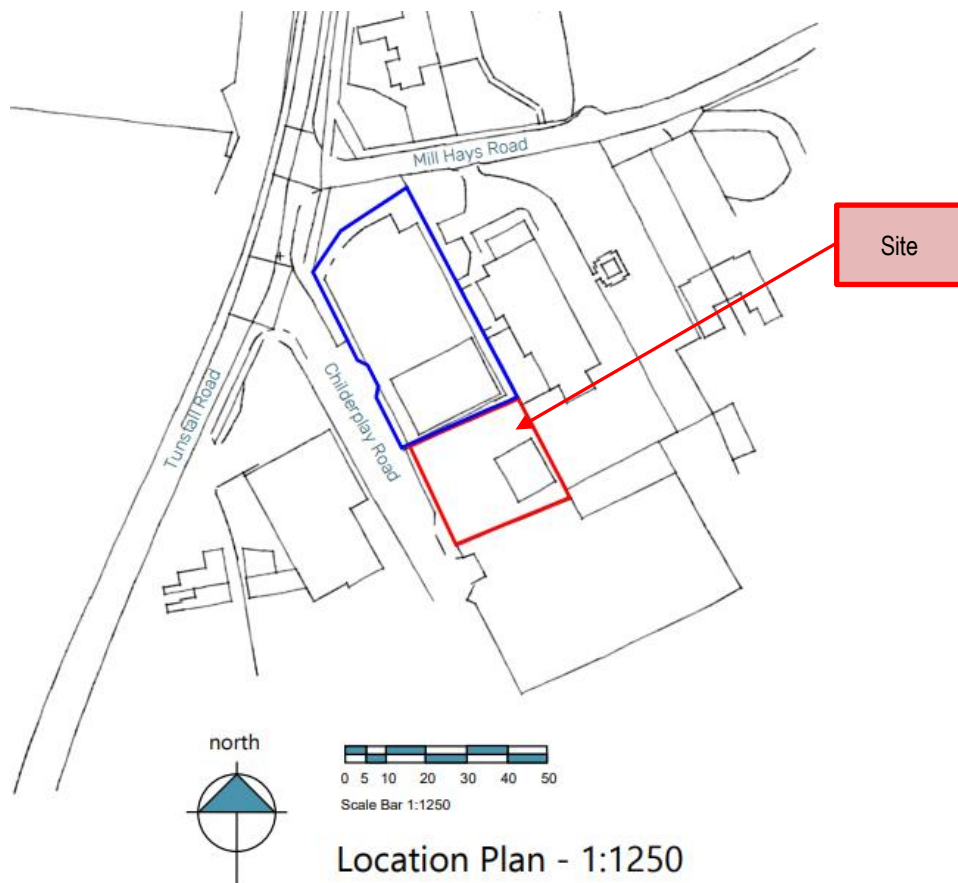


Figure 3: Photograph



3.0 ASSESSMENT OF DATA

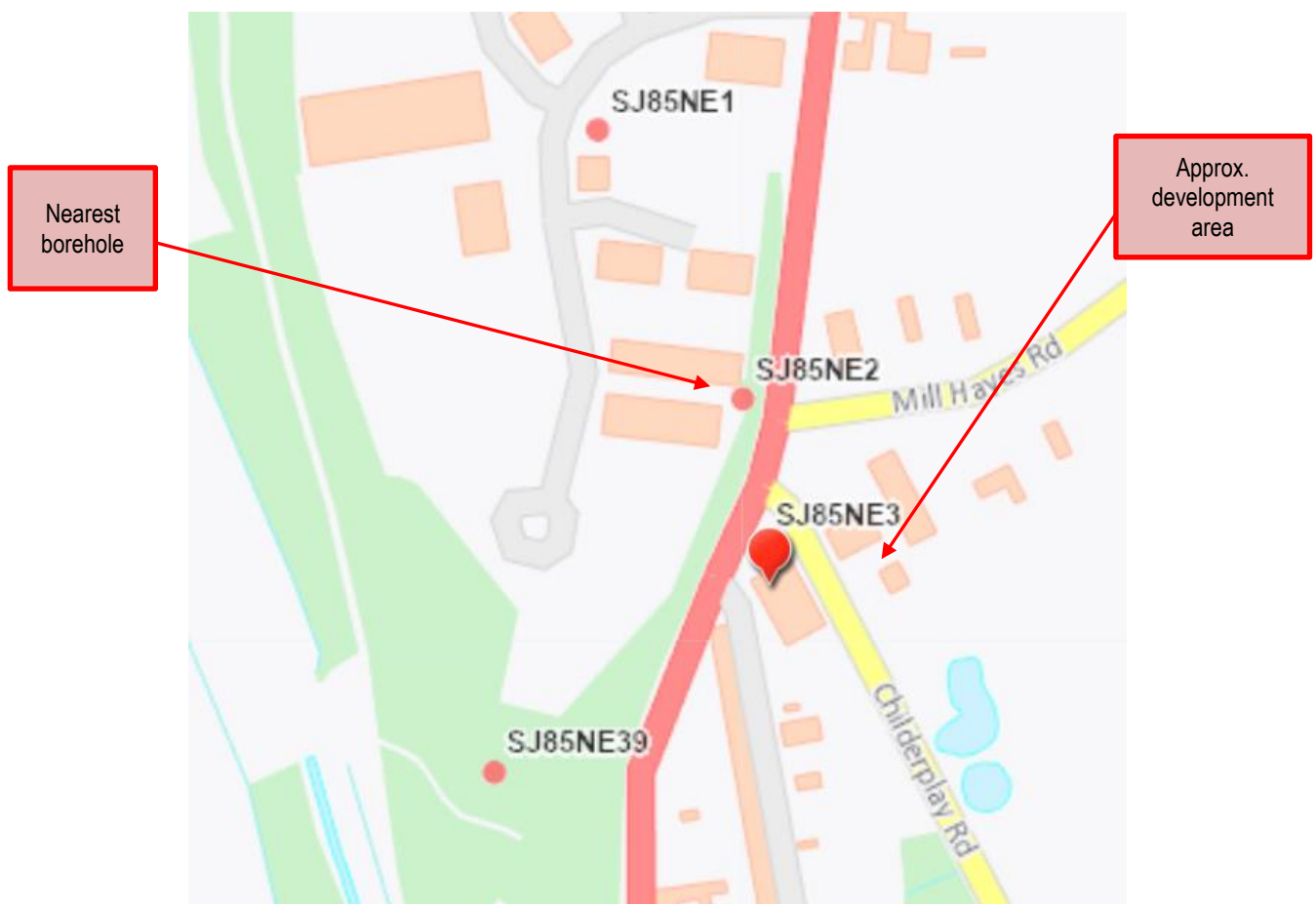
Geological Information

- 3.1 The geology of the site has been determined from geological maps for the area and examination of Coal Authority (CA) records.

British Geological Survey Published Data Assessment

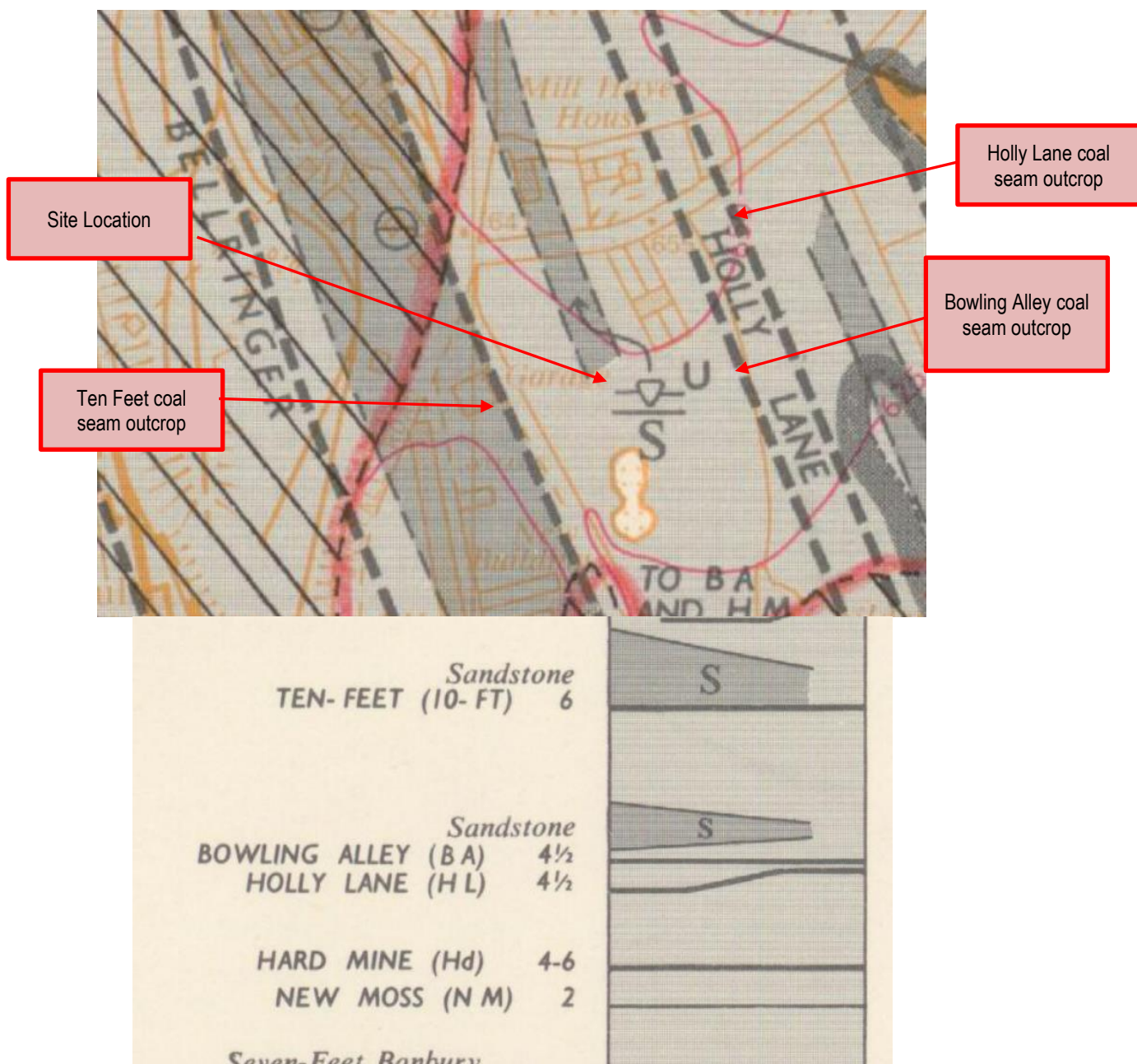
- 3.2 The BGS states that superficial deposits consisting of glacial clay underlie the site.
- 3.3 The bedrock geology beneath the site is shown to be the Pennine Middle Coal Measures Formation consisting of siltstone and sandstone.
- 3.4 There are several BGS boreholes within the area which allow for further assessment of the local geology, rockhead depth or shallow coal mining regime.
- 3.5 Borehole SJ85NE2, encountered a rockhead at 0.68m with the Ten Foot coal seam (1.95m thick) at 11.64m. The Magpie and Holly Lane coal seams lie at a depth of 68.09m and 80.29m.

Figure 4: BGS Boreholes



- 3.6 An extract from the most recently published geological map (1:10,000 scale map) showing the approximate site location and key local geological features is presented in Figure 5. Local strata dip to the south west at thirty degrees from the horizontal.
- 3.7 The Holly Lane and Bowling Alley coal seams outcrop to the north east of the site and due to the prevailing dip direction underlie the site at a shallow depth. Both coal seams have an unworked thickness of 1.37m.
- 3.8 Based on a angle of dip of thirty degrees the Bowling Alley coal seam is postulated to underlie the site at 39m below ground level, assuming 1m of superficial deposits.

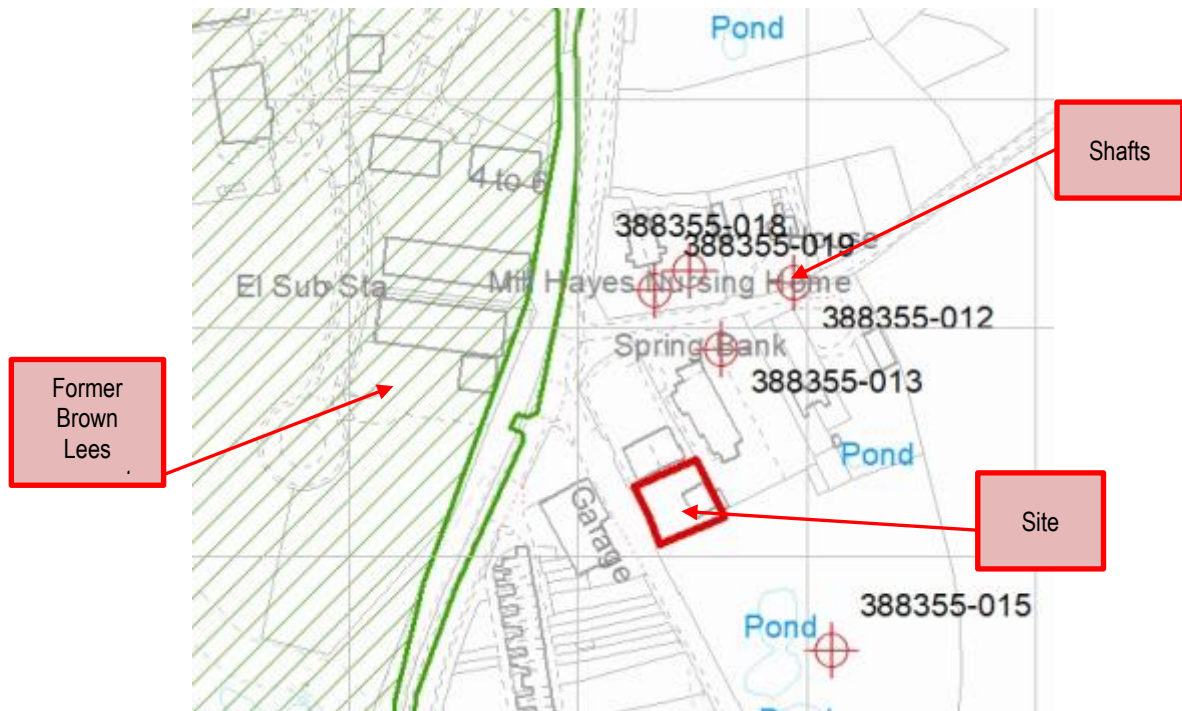
Figure 5: Geology Map Extract



Coal Authority Records

- 3.9 Reference to the Coal Authority Online Interactive viewer shows the site to be located within a Development High Risk Area and within an area of shallow probable mine workings.
- 3.10 A Coal Authority Mining Report has been acquired for the site and reveals that there are records of past underground mine workings beneath the site.
- 3.11 The shallowest worked coal seam was the Bowling Alley (1.40m thick) which was last worked in 1874 at a depth of 51m. The coal seam dips at nineteen degrees to the southwest.
- 3.12 The Coal Authority also report indicates that the site is located within an area of probable shallow coal mine workings.
- 3.13 The Brown Lees opencast was located to the west of the site.
- 3.14 There are no spine roadways recorded at shallow depth.
- 3.15 There are several mine shafts entries recorded within 100m of the site.
- 3.16 There are no geological faults, fissures or break lines recorded on the site.
- 3.17 Coal Authority reports there are no outcrops recorded on site.
- 3.18 There are no records of any opencast mines and managed tips within 500m of the site.
- 3.19 There are no records of claims regarding coal mining subsidence within 50m of the site boundary.
- 3.20 No records of mine gas have been recorded within 500m of the site boundary.
- 3.21 There are no mine water treatment schemes within 500m of the site boundary.

Figure 6: Coal Authority Map Extract



4.0 COAL MINING RISK ASSESSMENT

Scope of Coal Mining Risk Assessment

- 4.1 Objectives of the coal mining risk assessment are to provide a desk-based assessment of available geological and mining information relating to the site (and wider area) and to use this information so as to identify risks present to the development from the legacy of mining.
- 4.2 As part of the risk assessment, potential mitigation measures (if required) should be considered, including any necessary remedial works.
- 4.3 The outcome of the risk assessment should demonstrate to the Local Authority that the proposed development is or can be made safe (and stable) to meet the requirements of the National Planning Policy Framework (NPPF).

Data Limitations

- 4.4 It should be appreciated that it did not become a legal requirement to deposit coal mining abandonment plans until the 1870's and that this requirement was not rigorously enforced for some time after. Many shallow coal seams were worked prior to the introduction of first edition Ordnance Survey Maps and information on these workings is often not available. Therefore, if coal seams were accessible then there is the potential that they could have been worked by formal or informal means.
- 4.5 It is also possible that if unrecorded workings are present then unrecorded mine entries may be present.

Coal Mining Risks

- 4.6 The risks associated with coal mining are as follows:
 - Collapse of relict workings beneath buildings causing damage to the building fabric and infrastructure.
 - Migration of mine gases from old mine workings and mine entries resulting in accumulation of flammable and asphyxiating gases in confined areas.
 - Consolidation of relict workings and overlying strata causing structural defects in building fabric and infrastructure.
 - Failure of mine entries causing loss of ground beneath building and external areas.
 - Spontaneous combustion of old mine workings.

Coal Mining Assessment Criteria

- 4.7 Shallow workings related ground subsidence events may manifest as localised crown hole collapses at the surface (which are related to workings roof failures), or can be associated with more extensive ground movements, typically associated with pillar collapse, floor heave, or a combination of roof and pillar failure.

- 4.8 As there is limited evidence for structural damage caused by pillar failure compared with that resulting from roof collapses, the focus of engineering assessments of the potential for instability at the ground surface has focussed on roof collapses as the more likely mechanism of failure.
- 4.9 The limit height on void migration for roof collapses, where no appreciable surface subsidence can result is termed 'acceptable cover.' The calculation of the amount of acceptable cover is determined by the worked thickness of the seam (t) and the amount of overlying rock cover (h) (and potentially overconsolidated Glacial Till cover – see below).
- 4.10 The acceptable cover criterion is generally referred to as ht.
- 4.11 The worked thickness of a coal seam (t) is often taken as being whichever is the greater of the following: 1.50m (the typical height of a mining roadway), or the coal seam thickness.
- 4.12 It is noted that a thickness greater than that of the coal seam may have been extracted during mining – for example to remove a weak underlying seat earth horizon (for use as fireclay and/or to aid access through the mine).
- 4.13 According to CIRIA C758D, from the examination of mines within CMS, the height of collapse migration might exceptionally extend to 10t the height of the original extraction.
- 4.14 As a result of this, the 10t criterion has been adopted by the industry as providing reasonable assurance against surface subsidence from roof collapses in old pillar and stall mines.
- 4.15 However, there are documented cases (albeit rare) where migrations in excess of 20t have been observed.
- 4.16 CIRIA C758D lists a number of circumstances where the acceptable cover criterion may need to be increased from 10t. These include:

Where the strata dip is >20 degrees

Where there are strong groundwater flows within workings and/or where there are rising or falling groundwater levels.

Where multi-seam extractions have taken place

Conclusions

- 4.17 The Coal Authority consider the site area to lie within a Coal Authority Development High Risk Area due to possible shallow worked coal seams.
- 4.18 The shallowest worked coal seam (Bowling Alley) underlying the site lies at a depth of 51m and dips 18 degrees to the south west.
- 4.19 Given the depth of the coal seam and the thickness of rock cover there is a low risk to any surface structure from mine related subsidence.

Proposed Mitigation Strategy

- 4.20 No remedial measures are necessary, and this report should be provided to the council as part of any planning submission.

APPENDIX 1

COAL AUTHORITY CONSULTANTS MINING REPORT

APPENDIX 2

REPORT LIMITATIONS

REPORT LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget, and staff resources allocated to the project.

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The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified.

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Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site.